

IN THE CLAIMS

1-51.(cancelled)

52. (previously presented) A wiring circuit panel, comprising:

a first metal layer having a major surface extending in lateral directions, said first metal layer including a wiring circuit pattern;

an insulating film overlying said major surface of said first metal layer, said insulating film having a major surface remote from said major surface of said first metal layer;

a plurality of discrete solid metal bumps overlying said major surface of said first metal layer and extending upward through openings in said insulating film, said plurality of metal bumps having upwardly facing top faces, said top faces being flush with exposed regions of said major surface of said insulating film; and

a plurality of solder balls disposed in contact with said top faces of said plurality of metal bumps, said plurality of solder balls being in conductive communication with said plurality of metal bumps.

53. (previously presented) The wiring circuit panel as claimed in claim 52, wherein said first metal layer and said plurality of metal bumps consist essentially of copper.

54. (previously presented) The wiring circuit panel as claimed in claim 52, wherein at least a portion of said insulating film is flexible.

55. (previously presented) The wiring circuit panel as claimed in claim 52, wherein said top face of each of said plurality of metal bumps is concave and said plurality of solder balls contact said concave top faces of said plurality of metal bumps.

56. (previously presented) A circuit module, comprising:
a flexible circuit panel including

a first metal layer including a wiring circuit pattern having a major surface extending in lateral directions;

a substantially flexible insulating film overlying said major surface of said wiring circuit pattern, said insulating film having a major surface remote from said major surface of said wiring circuit pattern;

a plurality of discrete solid metal bumps overlying said major surface of said wiring circuit pattern and extending upward through openings in said insulating film, said plurality of metal bumps having upwardly facing top faces, said top faces being flush with exposed regions of said major surface of said insulating film; and

a plurality of solder balls disposed in contact with said top faces of said plurality of metal bumps, said plurality of solder balls being in conductive communication with said plurality of metal bumps; and

a second circuit panel having a substantially rigid dielectric element and a second wiring circuit pattern overlying at least a portion of said rigid dielectric element,

said second circuit panel being joined to said flexible circuit panel such that said second wiring circuit pattern conductively communicates with said wiring circuit pattern of said flexible circuit panel through said plurality of metal bumps.

57. (previously presented) The wiring circuit panel as claimed in claim 52, further comprising a second metal layer overlying said major surface of said first metal layer, wherein said plurality of metal bumps overlie said second metal layer, said second metal layer being an etch stop layer which substantially resists an etchant which would attack a first metal included in said first metal layer.

58. (previously presented) The wiring circuit panel as claimed in claim 57, wherein said plurality of metal bumps are

formed by etching a third metal layer overlying said second metal layer.

59. (previously presented) The wiring circuit panel as claimed in claim 58, wherein said plurality of metal bumps and said first metal layer each consists essentially of a first metal.

60. (new) A wiring circuit panel, comprising:

a first metal layer having a major surface extending in lateral directions, said first metal layer including a wiring circuit pattern;

an insulating film overlying said major surface of said first metal layer, said insulating film having a major surface remote from said major surface of said first metal layer;

a plurality of discrete solid metal bumps overlying said major surface of said first metal layer and extending upward through openings in said insulating film, said plurality of metal bumps having upwardly facing concave top faces, said top faces being flush with exposed regions of said major surface of said insulating film; and

a plurality of solder balls having a convex bottom portion disposed in contact with said concave top faces of said plurality of metal bumps, said plurality of solder balls being in conductive communication with said plurality of metal bumps.

61. (new) The wiring circuit panel of claim 60, wherein said top faces of each of said metal bumps has an edge portion adjacent to a wall of said insulating film and a middle portion distal from said wall, wherein a height of said middle portion above said first metal layer is less than a height of said edge portion above said first metal layer.

62. (new) The wiring circuit panel of claim 61, wherein said height of said middle portion above said first metal layer is less than a height of said major surface of said insulating film above said first metal layer.

a central portion and an edge portion surrounding the central portion.

63. (new) The wiring circuit panel of claim 61, wherein said middle portion is not flush with said insulating film.

64. (new) The wiring circuit panel of claim 61, wherein said height of said edge portion above said first metal layer is equivalent to a height of said major surface of said insulating film above said first metal layer.

65. (new) The wiring circuit panel of claim 60, further comprising a solder resist formed on said insulating film.

66. (new) A wiring circuit panel, comprising:

a first metal layer having a major surface extending in lateral directions, said first metal layer including a wiring circuit pattern;

an insulating film overlying said major surface of said first metal layer, said insulating film having a major surface remote from said major surface of said first metal layer;

a plurality of discrete solid metal bumps overlying said major surface of said first metal layer and extending upward through openings in said insulating film, said plurality of metal bumps having upwardly facing top faces, wherein said top faces of each of said metal bumps has an edge portion adjacent to a wall of said insulating film and a middle portion distal from said wall, wherein a height of said middle portion above said first metal layer is less than a height of said edge portion above said first metal layer, said top faces being flush with exposed regions of said major surface of said insulating film; and

a plurality of solder balls disposed in contact with said

top faces of said plurality of metal bumps, said plurality of solder balls being in conductive communication with said plurality of metal bumps.